

WHAT IS CLAIMED IS:

1. An apparatus for arranging components into an assembly, comprising:
 - a first conveyor means for receiving and for transporting successive layers of components to a distribution position;
 - a distribution means located at the distribution position for selectively repositioning the successive layers of components from the first conveyor means;
 - a second outfeed conveyor means for receiving from the distribution means selected layers of the successive layers of components repositioned on the second outfeed conveyor means by the distribution means and for transporting the selected layers of the successive layers of components to an outfeed conveyor position;
 - a third tine conveyor means for receiving from the distribution means other selected layers of the successive layers of components repositioned on the third tine conveyor means by the distribution means and for transporting components of the other selected layers of the successive layers of components to a tine conveyor position;
 - a separating means positioned with the third tine conveyor means for separating the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of rows spaced apart to provide for at least one opening in the arrangement of rows to form a tine receiving layer;
 - a carriage means for transporting the tine receiving layer from the tine conveyor position to the outfeed conveyor position and for positioning the tine receiving layer at the outfeed conveyor position of the second outfeed conveyor means; and
 - a transferring means for positioning at least one layer of components including the tine receiving layer for forming an assembly of components including the at least one opening in the tine receiving layer.

2. The apparatus of Claim 1, further comprising:
 - a binding means for binding the assembly of components into an integrated structure.
3. The apparatus of Claim 2, wherein the components comprise bricks.
4. The apparatus of Claim 1, further comprising:
 - a binding means for binding the assembly of components into an integrated structure.
5. The apparatus of Claim 4, further comprising:
 - a controller for controlling the operation of the first conveyor means, the distribution means, the second outfeed conveyor means, the third tine conveyor means, the separating means, the carriage means, the transferring means, and the binding means to form the assembly of components and to bind the assembly of components into the integrated structure.
6. The apparatus of Claim 5, wherein the components comprise bricks.
7. The apparatus of Claim 1, further comprising:
 - a controller for controlling the operation of the first conveyor means, the distribution means, the second outfeed conveyor means, the third tine conveyor means, the separating means, the carriage means, and the transferring means to form the assembly of components.
8. The apparatus of Claim 7, wherein the components comprise bricks.

9. The apparatus of Claim 1, further comprising:

a packaging conveyor means for receiving, from the transferring means, layers of components, including the tine receiving layer, including a guiding means arranged for successively positioning and aligning a corresponding number of layers of components at various positions on the packaging conveyor means for forming the assembly of components of a predetermined number of layers of components.

10. The apparatus of Claim 9, further comprising:

a binding means for binding the assembly of components into an integrated structure.

11. The apparatus of Claim 10, further comprising:

a controller for controlling the operation of the first conveyor means, the distribution means, the second outfeed conveyor means, the third tine conveyor means, the separating means, the carriage means, the transferring means, the packaging conveyor means and the binding means to form the assembly of components and to bind the assembly of components into the integrated structure.

12. The apparatus of Claim 11, wherein the components comprise bricks.

13. The apparatus of Claim 11, wherein

the carriage means transports the tine receiving layer from the tine conveyor position to the outfeed conveyor position and positions the tine receiving layer on a layer of the selected layers of components positioned at the outfeed conveyor position of the second outfeed conveyor means; and

the transferring means positions at least one layer of components over the tine receiving layer to form the assembly of components including the at least one opening in the tine receiving layer.

14. The apparatus of Claim 13, wherein the components comprise bricks.

15. The apparatus of Claim 11, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means parallel to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a direction of travel of the second outfeed conveyor means and transports the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers being oriented perpendicular to a direction of travel of the third tine conveyor means and transports the components of the other selected layers of the successive layers of components to the tine conveyor position.

16. The apparatus of claim 15, wherein the components comprise bricks.

17. The apparatus of claim 15, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

18. The apparatus of claim 17, wherein the components comprise bricks.

19. The apparatus of Claim 11, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means perpendicular to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the second outfeed conveyor means and transports the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transports

the components of the other selected layers of the successive layers of components to the tine conveyor position.

20. The apparatus of claim 19, wherein the components comprise bricks.

21. The apparatus of claim 19, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement including at least one pair of rows spaced apart from at least one single row to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

22. The apparatus of claim 21, wherein the components comprise bricks.

23. The apparatus of claim 21, wherein

the arrangement of rows forming the tine receiving layer comprises a double-single-double arrangement of rows.

24. The apparatus of claim 23, wherein the components comprise bricks.

25. The apparatus of claim 21, wherein

the arrangement of rows forming the tine receiving layer comprises a single-double-single arrangement of rows.

26. The apparatus of claim 25, wherein the components comprise bricks.

27. The apparatus of Claim 11, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means perpendicular to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a direction of travel of the second outfeed conveyor means and transports the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transports the components of the other selected layers of the successive layers of components to the tine conveyor position.

28. The apparatus of claim 27, wherein the components comprise bricks.

29. The apparatus of claim 27, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows

spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

30. The apparatus of claim 29, wherein the components comprise bricks.

31. The apparatus of Claim 1, wherein

the carriage means transports the tine receiving layer from the tine conveyor position to the outfeed conveyor position and positions the tine receiving layer on a layer of the selected layers of the successive layers of components positioned at the outfeed conveyor position of the second outfeed conveyor means; and

the transferring means positions at least one layer of components over the tine receiving layer to form the assembly of components including the at least one opening in the tine receiving layer.

32. The apparatus of Claim 31, wherein the components comprise bricks.

33. The apparatus of Claim 1, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means parallel to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a direction of travel of the second outfeed conveyor means and transports

the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transports the components of the other selected layers of the successive layers of components to the tine conveyor position.

34. The apparatus of claim 33, wherein the components comprise bricks.

35. The apparatus of claim 33, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

36. The apparatus of claim 35, wherein the components comprise bricks.

37. The apparatus of Claim 1, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means perpendicular to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the second outfeed conveyor means and transports the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transports the components of the other selected layers of the successive layers of components to the tine conveyor position.

38. The apparatus of claim 37, wherein the components comprise bricks.

39. The apparatus of claim 37, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement including at least one pair of rows spaced apart from at least one single row to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

40. The apparatus of claim 39, wherein the components comprise bricks.

41. The apparatus of claim 39, wherein

the arrangement of rows forming the tine receiving layer comprises a double-single-double arrangement of rows.

42. The apparatus of claim 41, wherein the components comprise bricks.

43. The apparatus of claim 39, wherein

the arrangement of rows forming the tine receiving layer comprises a single-double-single arrangement of rows.

44. The apparatus of claim 43, wherein the components comprise bricks.

45. The apparatus of Claim 1, wherein

the first conveyor means transports the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented by the transferring means perpendicular to a direction of travel of the first conveyor means;

the distribution means located at the distribution position selectively repositions and orients the longitudinal axis of the successive layers of components from the first conveyor means;

the second outfeed conveyor means receives from the distribution means the selected layers of the successive layers of components repositioned and oriented on the second outfeed conveyor means by the distribution means with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a direction of travel of the second outfeed conveyor means and transports the selected layers of the successive layers of components to the outfeed conveyor position; and

the third tine conveyor means receives from the distribution means the other selected layers of the successive layers of components repositioned and oriented on the third tine conveyor means by the distribution means with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transports

the components of the other selected layers of the successive layers of components to the tine conveyor position.

46. The apparatus of claim 45, wherein the components comprise bricks.

47. The apparatus of claim 45, wherein

the separating means positioned with the third tine conveyor means separates the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

48. The apparatus of claim 47, wherein the components comprise bricks.

49. A method for arranging components into an assembly, comprising the steps of:

receiving and transporting successive layers of components to a distribution position;

selectively repositioning at the distribution position the successive layers of components transported to the distribution position;

transporting selected layers of the successive layers of components repositioned at the distribution position to an outfeed conveyor position;

transporting components of other selected layers of the successive layers of components repositioned at the distribution position to a tine conveyor position;

separating the components of the other selected layers of the successive layers of components repositioned at the distribution position to be transported to the tine conveyor position into an arrangement of rows spaced apart to provide for at least one opening in the arrangement of rows to form a tine receiving layer;

transporting the tine receiving layer from the tine conveyor position to the outfeed conveyor position and positioning the tine receiving layer at the outfeed conveyor position; and

positioning at least one layer of components including the tine receiving layer for forming an assembly of components including the at least one opening in the tine receiving layer.

50. The method of Claim 49, further comprising the step of:

providing components that comprise bricks.

51. The method of Claim 50, further comprising the step of:

binding the assembly of components into an integrated structure.

52. The method of Claim 49, further comprising the step of:

binding the assembly of components into an integrated structure.

53. The method of Claim 49, further comprising the steps of:

transporting the tine receiving layer from the tine conveyor position to the outfeed conveyor position and positioning the tine receiving layer on a layer of the selected layers of the successive layers of components positioned at the outfeed conveyor position; and

positioning at least one layer of components over the tine receiving layer to form the assembly of components including the at least one opening in the tine receiving layer.

54. The method of Claim 49, further comprising the steps of:

transporting on a first conveyor means the successive layers of components to the distribution position with a longitudinal axis of the successive layers of

components being oriented parallel to a direction of travel of the first conveyor means;

selectively repositioning the successive layers of components from the first conveyor means and selectively orienting the longitudinal axis of the successive layers of components from the first conveyor means;

repositioning and orienting on a second outfeed conveyor means the selected layers of the successive layers of components with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a direction of travel of the second outfeed conveyor means and transporting the selected layers of the successive layers of components to the outfeed conveyor position; and

repositioning and orienting on a third tine conveyor means the other selected layers of the successive layers of components with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transporting the components of the other selected layers of the successive layers of components to the tine conveyor position.

55. The method of Claim 54, further comprising the step of:

providing components that comprise bricks.

56. The apparatus of claim 54, further comprising the step of:

separating the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

57. The method of Claim 56, further comprising the step of:

providing components that comprise bricks.

58. The method of Claim 49, further comprising the steps of:

transporting on a first conveyor means the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented perpendicular to a direction of travel of the first conveyor means;

selectively repositioning the successive layers of components from the first conveyor means and selectively orienting the longitudinal axis of the successive layers of components from the first conveyor means;

repositioning and orienting on a second outfeed conveyor means the selected layers of the successive layers of components with the longitudinal axis of the selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the second outfeed conveyor means and transporting the selected layers of the successive layers of components to the outfeed conveyor position; and

repositioning and orienting on a third tine conveyor means the other selected layers of the successive layers of components with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transporting the components of the other selected layers of the successive layers of components to the tine conveyor position.

59. The method of Claim 58, further comprising the step of:

providing components that comprise bricks.

60. The method of claim 58, further comprising the step of:

separating the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

61. The method of Claim 60, further comprising the step of:
providing components that comprise bricks.
62. The method of claim 60, further comprising the step of:
forming the arrangement of rows comprising the tine receiving layer to comprise a double-single-double arrangement of rows.
63. The method of Claim 62, further comprising the step of:
providing components that comprise bricks.
64. The method of claim 60, further comprising the step of:
forming the arrangement of rows comprising the tine receiving layer to comprise a single-double-single arrangement of rows.
65. The method of Claim 64, further comprising the step of:
providing components that comprise bricks.
66. The method of Claim 49, further comprising the steps of:
transporting on a first conveyor means the successive layers of components to the distribution position with a longitudinal axis of the successive layers of components being oriented perpendicular to a direction of travel of the first conveyor means;
selectively repositioning the successive layers of components from the first conveyor means and selectively orienting the longitudinal axis of the successive layers of components from the first conveyor means;
repositioning and orienting on a second outfeed conveyor means the selected layers of the successive layers of components with the longitudinal axis of the selected layers of the successive layers of components being oriented parallel to a

direction of travel of the second outfeed conveyor means and transporting the selected layers of the successive layers of components to the outfeed conveyor position; and

repositioning and orienting on a third tine conveyor means the other selected layers of the successive layers of components with the longitudinal axis of the other selected layers of the successive layers of components being oriented perpendicular to a direction of travel of the third tine conveyor means and transporting the components of the other selected layers of the successive layers of components to the tine conveyor position.

67. The method of Claim 66, further comprising the step of:

providing components that comprise bricks.

68. The apparatus of claim 66, further comprising the step of:

separating the components of the other selected layers of the successive layers of components repositioned on the third tine conveyor means into an arrangement of pairs of rows spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

69. The method of Claim 68, further comprising the step of:

providing components that comprise bricks.

70. An assembly of components, comprising:

a plurality of layers of components arranged in a stacked relation;

a tine receiving layer of components positioned in the plurality of layers of components, the tine receiving layer including at least one tine receiving opening.

71. The assembly of Claim 70, wherein

the components comprise bricks.

72. The assembly of claim 70, further comprising:

 a binding means for binding the plurality of layers of components, including the tine receiving layer, into an integrated structure.

73. The assembly of Claim 72, wherein

 the components comprise bricks.

74. The assembly of Claim 70, wherein

 the tine receiving layer includes an arrangement of rows of the components spaced apart to provide at least one pair of openings in the arrangement of rows to form the tine receiving layer.

75. The assembly of Claim 74, wherein

 the components comprise bricks.

76. The assembly of claim 74, further comprising:

 a binding means for binding the plurality of layers of components, including the tine receiving layer, into an integrated structure.

77. The assembly of Claim 76, wherein

 the components comprise bricks.

78. The assembly of Claim 74, wherein

 the arrangement of rows of the components in the tine receiving layer includes pairs of rows spaced apart to provide at least one pair of openings in the tine receiving layer.

79. The assembly of Claim 78, wherein

the components comprise bricks.

80. The assembly of claim 78, further comprising:

a binding means for binding the plurality of layers of components, including the tine receiving layer, into an integrated structure.

81. The assembly of Claim 80, wherein

the components comprise bricks.

82. The assembly of Claim 74, wherein

the arrangement of rows comprising the tine receiving layer includes a double-single-double arrangement of rows.

83. The assembly of Claim 82, wherein

the components comprise bricks.

84. The assembly of Claim 74, wherein

the arrangement of rows comprising the tine receiving layer includes a single-double-single arrangement of rows.

85. The assembly of Claim 84, wherein

the components comprise bricks.